Attachment No. PC 10

May 21, 2012 Mestre Greve Associates
Noise Assessment

NOISE ASSESSMENT FOR
MARINER'S POINTE
CITY OF NEWPORT BEACH

REPORT #529101N02
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The purpose of this report is to assess compliance with the City of Newport Beach Noise Ordinance for the proposed Mariner's Pointe Project in the City of Newport Beach. The project proposes the development of a retail development on the north side of Pacific Coast Highway immediately west of Dover Drive. Figure 1 presents a vicinity map showing the location of the project. Figure 2 presents an aerial photo of the project. The aerial photo shows that there are residences located directly to the north of the project. These homes are located on bluff overlooking the project site. The pad elevations of the homes are approximately 60 feet above sea level. There are also residences to the south of the project across West Coast Highway at approximately the same ground elevation of the project. The first level of the project is at an elevation of 14.0 feet above sea level.

There are three sources of noise in the project that could generate noise levels exceeding the City's Noise Ordinance that are examined. These three sources are; vehicle activities on the top level of the proposed parking structure, activity on the dining patio on the second level of the structure, and mechanical (HVAC) equipment. The locations of these noise sources are indicated on Figure 2.

At the time the Initial Study/MND for the project (The Planning Center|DC&E 2011) was prepared the HVAC and other mechanical systems were to be installed in a fully enclosed mechanical penthouse on the roof of the retail building with venting to the south towards West Coast Highway. The noise levels generated by the equipment in this configuration was determined to comply with the City's Noise Ordinance and the noise impact was determined to be less than significant. As a result of project design revisions, the mechanical equipment area will be covered with a screening wall rather than being enclosed in a penthouse. The screening wall will visually obscure the equipment but will provide minimal sound attenuation due to ventilation requirements for the mechanical equipment. The floor of the mechanical equipment area will be sloped with a highest elevation of approximately 41.17 feet above sea level. The top of mechanical area screening wall will be 49.0 feet above sea level.

The parking structure will include an exhaust fan. The outlet to the parking structure exhaust fan is shown in Figure 2 and located at the northeast corner of the project site at the top level of the parking structure. The top of the garage exhaust fan will be at an elevation of 53.33 feet.

This report analyzes the noise generated by project at the residences located above the project for compliance with the City of Newport Beach Municipal Code Noise Ordinance. Section 2.0 presents background information on noise criteria and metrics, the noise criteria adopted by the City of the Newport Beach, and the results of existing noise measurements. Noise levels generated by operational activities at the project are analyzed and compared to the City's Noise Ordinance in Section 3.0.

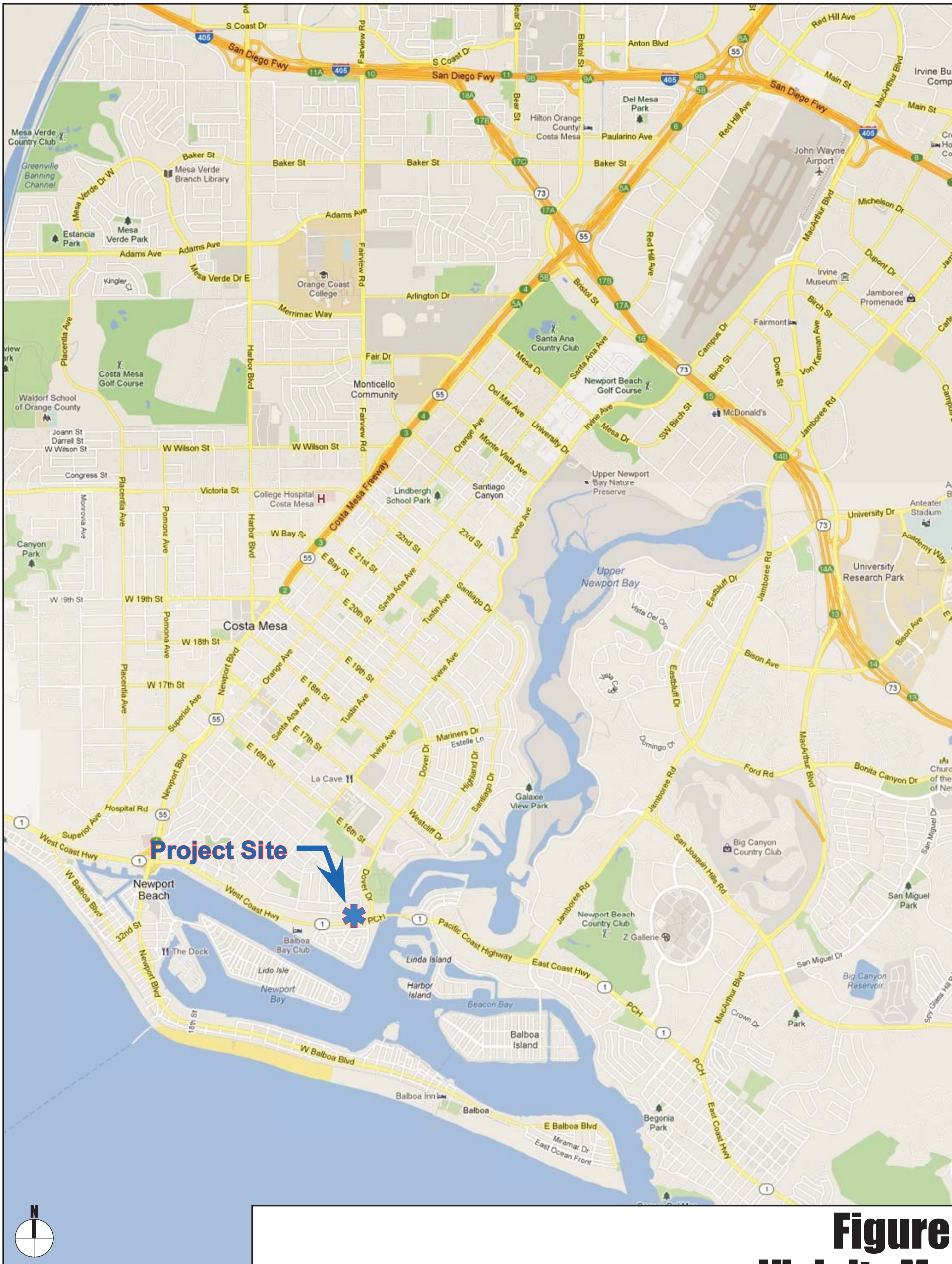

Figure 1
Vicinity Map

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Project Site
Proposed Parking Structure
Proposed Commercial Building

N
0' 50' 100'

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Figure 2
Project Area

2.0 EXISTING SETTING

2.1 Background Information on Noise

2.1.1 Noise Criteria Background

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the decibel (dB). Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, a sound 10 dB higher than another is judged to be twice as loud; a sound 20 dB higher is perceived to be four times as loud; and so forth. Everyday sounds normally range from 30 dB (very quiet) to 100 dB (very loud).

Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Community noise levels are measured in terms of the "A-weighted decibel," abbreviated dBA. Sound levels decrease as a function of distance from the source as a result of wave divergence, atmospheric absorption and ground attenuation. As the sound wave form travels away from the source, the sound energy is dispersed over a greater area, thereby dispersing the sound power of the wave. Atmospheric absorption also influences the levels that are received by the observer. The greater the distance traveled, the greater the influence and the resultant fluctuations. The degree of absorption is a function of the frequency of the sound as well as the humidity and temperature of the air. Turbulence and gradients of wind, temperature and humidity also play a significant role in determining the degree of attenuation. Intervening topography can also have a substantial effect on the effective perceived noise levels.

Noise has been defined as unwanted sound and it is known to have several adverse effects on people. From these known effects of noise, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. This criterion is based on known impacts of noise on people, such as hearing loss, speech interference, sleep interference, physiological responses and annoyance. Each of these potential noise impacts on people are briefly discussed in the following narratives:

> **HEARING LOSS** is not a concern in community noise situations of this type. The potential for noise induced hearing loss is more commonly associated with occupational noise exposures in heavy industry or very noisy work environments. Noise levels in neighborhoods, even in very noisy airport environs, are not sufficiently loud as to cause hearing loss.

> **SPEECH INTERFERENCE** is one of the primary concerns in environmental noise problems. Normal conversational speech is in the range of 60 to 65 dBA and any noise in this range or louder may interfere with speech. There are specific methods of describing speech interference as a function of distance between speaker and listener and voice level.

SLEEP INTERFERENCE is a major noise concern for traffic noise. Sleep disturbance studies have identified interior noise levels that have the potential to cause sleep disturbance. Note that sleep disturbance does not necessarily mean awakening from sleep, but can refer to altering the pattern and stages of sleep.

PHYSIOLOGICAL RESPONSES are those measurable effects of noise on people that are realized as changes in pulse rate, blood pressure, etc. While such effects can be induced and observed, the extent is to which these physiological responses cause harm or are signs of harm is presently unknown.

ANNOYANCE is the most difficult of all noise responses to describe. Annoyance is a very individual characteristic and can vary widely from person to person. What one person considers tolerable can be quite unbearable to another of equal hearing capability.

2.1.2 Noise Assessment Metrics

The description, analysis and reporting of community noise levels around communities is made difficult by the complexity of human response to noise and the myriad of noise metrics that have been developed for describing noise impacts. Each of these metrics attempts to quantify noise levels with respect to community response. Most of the metrics use the A-Weighted noise level to quantify noise impacts on humans. A-Weighting is a frequency weighting that accounts for human sensitivity to different frequencies.

Noise metrics can be divided into two categories: single event and cumulative. Single-event metrics describe the noise levels from an individual event such as an aircraft fly-over or perhaps a heavy equipment pass-by. Cumulative metrics average the total noise over a specific time period, which is typically 1 or 24-hours for community noise problems. For this type of analysis, cumulative noise metrics is typically used.

Several rating scales have been developed for measurement of community noise. These account for: (1) the parameters of noise that have been shown to contribute to the effects of noise on man, (2) the variety of noises found in the environment, (3) the variations in noise levels that occur as a person moves through the environment, and (4) the variations associated with the time of day. They are designed to account for the known health effects of noise on people described previously. Based on these effects, the observation has been made that the potential for a noise to impact people is dependent on the total acoustical energy content of the noise. A number of noise scales have been developed to account for this observation. The two most predominate noise scales are the: Equivalent Noise Level (LEQ) and the Community Noise Equivalent Level (CNEL). These scales are described in the following paragraphs along with the Ldn and L(%) scales that are also used for community noise assessment.

LEQ is the sound level corresponding to a steady-state sound level containing the same total energy as a time-varying signal over a given sample period. LEQ is the "energy" average noise level during the time period of the sample. LEQ can be measured for any time period, but is typically measured for 1 hour. This 1-hour noise level can also be referred to as the Hourly Noise Level (HNL), the energy average of all the events and background noise levels that occur during that time period.

CNEL, Community Noise Equivalent Level, is the predominant rating scale now in use in California for land use compatibility assessment. The CNEL scale represents a time weighted 24-hour average noise level based on the A-weighted decibel. Time weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized. The evening time period (7 p.m. to 10 p.m.) penalizes noises by 5 dBA, while nighttime (10 p.m. to 7 a.m.) noises are penalized by 10 dBA. These time periods and penalties were selected to reflect people's increased sensitivity to noise during these time periods. A CNEL noise level may be reported as a "CNEL of 60 dBA," "60 dBA CNEL," or simply "60 CNEL."

LDN, the day-night scale is similar to the CNEL scale except that evening noises are not penalized. It is a measure of the overall noise experienced during an entire day. The time-weighted refers to the fact that noise that occurs during certain sensitive time periods is penalized. In the Ldn scale, those noise levels that occur during the night (10 pm to 7 am) are penalized by 10 dB. This penalty was selected to attempt to account for increased human sensitivity to noise during the quieter period of a day, where resting at home and sleep are the most probable activities.

L(%) is a statistical method of describing noise which accounts for variance in noise levels throughout a given measurement period. L(%) is a way of expressing the noise level exceeded for a percentage of time in a given measurement period. For example since 5 minutes is 25% of 20 minutes, L(25) is the noise level that is equal to or exceeded for five minutes in a twenty-minute measurement period. It is L(%) that is used for many Noise Ordinance standards. For example, most daytime City, State and City Noise Ordinances use an ordinance standard of 55 dBA for 30 minutes per hour or an L(50) level of 55 dBA. In other words the Noise Ordinance states that no noise level should exceed 55 dBA for more that fifty percent of a given period. The L(%) levels are not used for the City of Noise Ordinance.

2.2 Noise Criteria

The Noise Ordinance and Noise Element of the General Plan contain the City's policies on noise. The Noise Ordinance applies to noise on one property impacting a neighboring property. Typically, it sets limits on noise levels that can be experienced at the neighboring property. The Noise Ordinance is part of the City's Municipal Code and is enforceable throughout the City. The Noise Element of the General Plan presents limits on noise levels from transportation noise sources, vehicles on public roadways, railroads and aircraft. These limits are imposed on new developments. The new developments must incorporate the measures to ensure that the limits are not exceeded. The City of Newport Beach Noise Ordinance and Noise Element policies are presented below in Sections 2.2.1 and 2.2.2.

2.2.1 City of Newport Beach Noise Element

The City of Newport Beach specifies outdoor and indoor noise limits for various land uses impacted by transportation noise sources. The noise limits specified in the City's Noise Element are in terms of the Community Noise Equivalent Level (CNEL). The standard states that for residential and hospital land uses, the exterior noise exposure level shall not exceed 65 CNEL and the interior noise exposure level shall not exceed 45 CNEL. Figure 3 presents the complete Interior and exterior noise standards for contained in the City of Newport Beach Noise Element.

LAND USE CATEGORIES		ENERGY AVERAGE CNEL	
CATEGORIES	USES	INTERIOR[1]	EXTERIOR[2]
RESIDENTIAL	Single Family, Two Family, Multiple Family	45[3] 55[4]	65
	Mobile Home	65	65
COMMERCIAL INDUSTRIAL INSTITUTIONAL	Hotel, Motel, Transient Lodging	45	65[6]
	Commercial Retail, Bank, Restaurant	55	-----
	Office Building, Research and Development, Professional Offices, City Office Building	50	-----
	Amphitheater, Concert Hall Auditorium, Meeting Hall	45	-----
	Gymnasium (Multipurpose)	50	-----
	Sports Club	55	-----
	Manufacturing, Warehousing, Wholesale, Utilities	65	-----
	Movie Theaters	45	-----
INSTITUTIONAL	Hospital, Schools' Classroom	45	65
	Church, Library	45	-----
OPEN SPACE	Parks	-----	65

INTERPRETATION

1. Indoor environment excluding: Bathrooms, toilets, closets, corridors
2. Outdoor environment limited to: Private yard of single family
   Multi-family private patio or balcony which is served by a means of an exit from inside.
   Mobile home park
   Hospital patio
   Park's picnic area
   School's playground
   Hotel and motel recreation area
3. Noise level requirement with closed windows. Mechanical ventilating system or other means of natural ventilation shall be provided as part of Chapter 12, Section 1205 of UBC.
4. Noise level requirement with open windows, if they are used to meet natural ventilation requirement.
5. Exterior noise level should be such that the interior noise level will not exceed 45 CNEL.
6. Except those areas around the airport within the 65 CNEL contour.

SOURCE: City of Newport Beach Noise Element

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Figure 3
City of Newport Beach Noise Standards

2.2.2 City of Newport Beach Noise Ordinance

The City of Newport Beach's Noise Ordinance is presented in three sections of the municipal code, Sections 10.26, 10.28, and 10.32. Section 10.28 "Loud and Unreasonable Noise" is what is often referred to as a "Nuisance Ordinance" in that it does not contain any specific noise level limits. It prohibits "the making, allowing, creation or maintenance of loud and unreasonable, unnecessary, or unusual noises which are prolonged, unusual, annoying, disturbing and/or unreasonable in their time, place and use are a detriment to public health, comfort, convenience, safety, general welfare and the peace and quiet of the City and its inhabitants." The specific provisions of Section 10.28 were substantially revised by the City in 2001 but the concept of the section was unchanged. Sections 10.28.040 and 10.28.045 are relevant to the Project in that they regulate construction noise and property maintenance noise. Effectively, these sections limit the hours of these activities to daytime hours. Section 10.32 "Sound Amplifying Equipment" regulates the use of sound amplification equipment and provides for permitting of sound amplification equipment.

Section 10.26 is the most relevant to the Project as it presents specific standards for noise generated on one property so that it does not significantly impact adjacent properties. This section is summarized and the specific noise standards from the ordinance are presented below. This section was adopted in 1995. Prior to that, the City had not established any specific sound level limits.

Table 1 presents the Noise Ordinance standards presented in Section 10.26 of the City's Municipal Code. The Noise Ordinance is applicable to noise generated from sources such as, dining patios, parking lots, and mechanical equipment. The Noise Ordinance requirements cannot be applied to mobile noise sources such as heavy trucks when traveling on public roadways. Federal and State laws preempt control of the mobile noise sources on public roads. However, the requirements can be applied to vehicles traveling on private property.

The City of Newport Beach exterior and interior noise criteria are given in terms of 15 minute Leq and Lmax noise levels. The noise levels specified are those that are not to be exceeded at a property from noise generated at a neighbor property. Noise levels are to be measured with A-weighting and a slow time response. Greater noise levels are permitted during the day (7 a.m. to 10 p.m.) as compared to the nighttime period (10 p.m. to 7 a.m.). If the ambient noise level (i.e., the noise level without the offending source) exceeds the applicable standard the ambient noise level becomes the standard.

Table 1
City Of Newport Beach Noise Ordinance Standards

Zone	Noise Metric	Noise Level Not To Be Exceeded 7 a.m. to 10 p.m. (daytime)	10 p.m. to 7 a.m. (nighttime)
EXTERIOR NOISE STANDARDS			
I Residential	Leq (15)	55 dBA	50 dBA
	Lmax	75 dBA	70 dBA
II Commercial	Leq (15)	65 dBA	60 dBA
	Lmax	85 dBA	80 dBA
III Mixed Use Residential*	Leq (15)	60 dBA	50 dBA
	Lmax	80 dBA	70 dBA
IV Industrial/Manufacturing	Leq (15)	70 dBA	70 dBA
	Lmax	90 dBA	90 dBA
INTERIOR NOISE STANDARDS			
I Residential	Leq (15)	45 dBA	40 dBA
	Lmax	65 dBA	60 dBA
III Mixed Use Residential*	Leq (15)	45 dBA	45 dBA
	Lmax	65 dBA	65 dBA

* Residential within 100' of a commercial property where noise is from said commercial property
If the ambient noise level exceeds the resulting standard, the ambient shall be the standard)

Section 10.26.055 "Noise Level Measurement" defines the locations where measurements can be made to determine compliance with the noise standards. It effectively defines where the Noise Ordinance standards are applicable. For residential areas, the exterior standard is applicable to any part of a private yard, patio, deck or balcony normally used for human activity. The standards are not applicable to non-human activity areas such as trash container storage areas, planter beds, above or contacting a property line fence, or other areas not normally used as part of the yard, patio, deck, or balcony. Interior noise standards are applicable anywhere inside the room at least 4 feet from the walls, or within the frame of an open window.

Section 10.26.045 sets different noise standards for HVAC equipment. HVAC equipment "in or adjacent to residential areas" cannot generate a noise level in excess of 50 dBA unless it includes a timing device that will deactivate the equipment between 10:00 p.m. and 7:00 a.m. in which the standard is raised to 55 dBA.

Section 10.26.35 "Exemptions" presents noise sources that are exempt from the provisions of the City's Noise Ordinance. Item G of Section 10.26.035 exempts noise sources associated with the maintenance of real property and instead requires that they be subject to Chapter 10.28 of the Municipal Code. Section 10.28.45 sets limits on the times of day that any "tool, equipment or machine" can be operated "in a manner which produces loud noise that disturbs, or could disturb, a person of normal sensitivity who works or resides in the vicinity." Specifically, the section restricts these activities to between 7:00 a.m. and 6:30 p.m. Monday through Friday, and between 8:00 a.m. and 6:00 p.m. on Saturday. These activities are prohibited on Sundays and federal Holidays.

2.3 Existing Noise Measurements

As discussed above, the City's Noise Ordinance contains a clause that if the ambient noise level is greater than the applicable standards presented in Table 1 then the ambient noise level becomes the applicable noise limit. To determine the ambient noise level at the homes north of the project 24-hour noise measurements were performed in the rear yard of a home directly north of the project located at 311 Kings Road. The location of the noise measurement is shown in Figure 2.

The noise measurement utilized a Brüel & Kjær 2238 automated digital noise data acquisition system. This instrument automatically calculates both the Equivalent Noise Level (LEQ) and Percent Noise Level (L%) for any specific time period. The noise monitor was equipped with a Brüel & Kjær 1/2-inch electret microphone and was calibrated with a Brüel & Kjær calibrator with calibration traceable to the National Bureau of Standards before and after each measurement. Calibration for the instrument is performed annually and is certified through the duration of the measurements. This measurement system satisfies the ANSI (American National Standards Institute) Standards 1.4 for Type 1 precision noise measurement instrumentation. The monitor was set up to record the Leq noise levels every one second.

The City's Noise Ordinance noise level limits are in terms of the energy average noise level during a 15 minute period (Leq(15)). Using the one second Leq levels recorded by the sound level meter the running Leq(15) was calculated along with the hourly Leq (Leq(H)). Table 2 presents the results of the measurements. The highest and lowest Leq(15) during each hour and is presented along with the Leq(H).

The ambient noise at the residences to the north of the project is primarily due to traffic on West Coast Highway. The initial study prepared for the project (The Planning Center|DC&E 2011) shows that the structures proposed by the project will act as noise barriers reducing traffic noise levels at these residences by as much as 6 dB. Therefore, with the project ambient noise levels could be reduced by as much as 6 dB compared to conditions when the measurements were made. Therefore, the minimum Leq(15) must be more than 6 dBA greater than the Noise Ordinance Limits (60 dBA daytime and 50 dBA nighttime) to result in the ambient noise level being greater than the applicable noise level limit. Measured levels more than 6 dBA greater than the applicable standard are shown in italics in Table 2.

The data in Table 2 shows that the Min Leq(15) is more than 6 dBA greater than the nighttime standard of 50 dBA during the 10:00 p.m. hour. However, the measured min Leq(15) is only 0.7 dBA greater than the limit. Adjusting the noise level limit is not appropriate however because the difference is so small. Ambient noise levels during all other hours are expected to be less than the Noise Ordinance limits after the project is constructed. Therefore, no adjustment to the noise level limits due to ambient noise levels is warranted.

Table 2
Noise Measurement Results

	Hour	Max Leq(15)	Leq(H)	Min Leq(15)
Thursday, March 29, 2012	12 PM	63.2	62.2	61.2
	1 PM	63.0	62.3	60.8
	2 PM	65.3	63.8	61.5
	3 PM	63.3	62.0	61.2
	4 PM	62.2	61.9	60.9
	5 PM	62.2	61.7	61.2
	6 PM	62.7	61.6	60.8
	7 PM	62.4	61.0	60.1
	8 PM	60.8	59.9	59.1
	9 PM	60.4	59.4	58.3
	10 PM	***58.6***	***57.6***	***56.7***
	11 PM	57.0	55.5	54.0
Friday March 30, 2012	12 AM	56.4	53.4	50.8
	1 AM	52.9	51.1	49.3
	2 AM	50.5	48.6	46.9
	3 AM	52.5	49.5	45.6
	4 AM	52.1	49.9	45.9
	5 AM	56.1	53.9	51.0
	6 AM	60.7	58.9	55.5
	7 AM	64.1	62.5	60.7
	8 AM	63.3	62.8	62.3
	9 AM	62.8	61.9	61.3
	10 AM	64.5	62.6	60.9
	11 AM	65.4	63.4	61.5
	12 PM	69.0	65.5	61.9
	1 PM	63.6	62.6	61.7
	2 PM	64.8	63.2	61.9

3.0 COMPLIANCE ANALYSIS

This section examines the noise generated by the project and its compliance with the City's Noise Ordinance at sensitive uses in the vicinity of the project. The primary noise sensitive use near the project are the residences located on the bluff above and immediately north of the project. There are residential uses located to the south of the project across West Coast Highway.

The criterion that will be used to determine the compliance of the project is discussed in Section 3.1. The characteristics of the three noise sources of concern are discussed in Section 3.2. The noise levels at the residences due to the noise sources of concern are discussed in Section 3.3 and any noise control requirements are identified.

3.1 Compliance Requirements

The noise generated by the project is required to comply with the noise level limits specified in City of Newport Beach Noise Ordinance presented previously in Section 2.2.2. The residences in the vicinity of the project are within 100 feet of a commercial area. Therefore, noise levels from the project are controlled by the Zone III Residential Mixed Use limits of an Leq(15) of 60 dBA and Lmax of 80 dBA during the daytime hours (7:00 a.m. to 10:00 p.m.) and an Leq(15) of 50 dBA and Lmax of 70 dBA during the nighttime hours (10:00 p.m. to 7:00 a.m.). Project generated noise levels greater than these levels would not be in compliance.

3.2 Noise Source Characteristics

The subsections below describe the characteristics of the noise sources of concern associated with the project and discuss the methodologies used to estimate noise levels at the residences.

3.2.1 Parking Structure Activity

The majority of the parking structure will be enclosed. The top floor of the parking structure will be covered with a roof and there will be a continuous wall from the floor to the celling on the north side of the structure. A section of the third floor parking area will be exposed at the south side of the parking structure as indicated in Figure 2.

Traffic associated with parking lots and structures is typically not of sufficient volume to exceed community noise standards that are based on a time averaged scale such as the CNEL or Leq scale. However, the instantaneous maximum sound levels generated by car door slamming, engine start-up, alarm activation and car pass-bys can be annoying to nearby residents. Tire squeal may also be a problem depending on the type of parking surface. Estimates of the maximum noise levels associated with some parking lot activities are presented in Table 3. These levels are based on measurements conducted by Mestre Greve Associates. The noise levels presented are for a distance of 50 feet from the source, and are the maximum noise level generated. A range is given to reflect the variability of noise generated by various automobile types and driving styles.

Table 3
Maximum Noise Levels Generated By Parking Lots
(dBA at 50 feet)

Event	Lmax
Door Slam	60 to 70
Car Alarm Activation	65 to 70
Engine Start-up	60 to 70
Car pass-by	55 to 70

The elevation of the 3rd floor of the parking structure is 38.5 feet above sea level. The portion of the third floor parking that is not covered is located approximately 60 feet from the north side of the parking structure and the north side of the parking structure is approximately 27 feet from the nearest residential outdoor living area for the residences to the north. The south side of the parking structure is approximately 110 feet from the residential outdoor living areas to the south.

Noise from the parking lot was calculated using standard acoustical methodologies. The source level was adjusted to account for attenuation due to geometric spreading (6 dB per doubling of distance). For the residences to the north, the noise reduction provided by the parking area enclosure (at least 20 dB) and the noise reduction provided by the enclosure acting as a noise barrier for the portion of the parking structure that is not covered was accounted for. For the residences to the south, the noise reduction of the 3.5' high wall along the edge of the parking structure was accounted for. Leq(15) noise levels from parking activities were assumed to be 20 dB less than the maximum level.

3.2.2 Dining Patio Activity

The project includes three dining patios as indicated in Figure 2. On the east side of the building, facing Dover Avenue there is an approximate 570 square foot dining patio on the first floor of the retail buildings and an approximate 1,260 square foot dining patio on the second floor. On the south side of the building, facing West Coast Highway there is an approximate 480 square foot dining patio on the south side of the second level of the retail buildings. The occupancy of the balconies was estimated based on 15 square feet per person and it was assumed that half the occupants would be speaking at one time. Normal conversation levels generate a noise level between 60 and 65 dBA at a distance of three feet. Maximum vocal effort will generate a noise level 15 to 20 dB higher than normal conversation levels. The nearest residential outdoor living area to the north is located approximately 123 feet from the patio area on the north side of the building and 93 feet from the patios on the east side. Further the structure acts as a noise barrier reducing noise levels from the patio to these residences by at least 15 dB. The nearest residential living area to the south are located approximately 117 feet from the patio area on the north side of the building and 158 feet from the patio areas on the south side of the building. Further, the structure acts as a noise barrier reducing noise levels from the patios on the north side of the building by at least 7 dB.

Noise from the dining patio was calculated using standard acoustical methodologies. The source level was adjusted to account for attenuation due to geometric spreading (6 dB per doubling of distance). The noise reduction provided by the structure discussed above was also accounted for.

3.2.3 Mechanical Equipment

Mechanical equipment that could generate considerable noise levels at the residences is located in two areas on the roof of the project as shown in Figure 2. The first area, located at the northwest corner of the building is the outlet duct of the garage exhaust fan. The second area is the mechanical equipment area on the north side of the retail building.

The garage exhaust fan is specified to be a Lorence Cook 100 SQN. Sound generation characteristics of this unit were obtained from the manufacturer. Sound power levels at the outlet of this unit were calculated using the octave band source sound power levels and methodology prescribed by the American Society of Heating, Air Conditioning and Refrigeration (ASHRAE 2007). Sound pressure levels at the residences was calculated using methodology prescribed in the Air Conditioning and Refrigeration Institute Standard 275 (ARI 2007). A calculation worksheet is presented in the appendix that shows the details of the calculations.

The several types of noise generating equipment will be located in the mechanical equipment area. This equipment includes nine outdoor condenser units, two make up air units, and three kitchens exhaust fans with pollution control units. Note that the retail tenants of the building, which have not been determined, will supply much of this equipment. To enable project design specific units were assumed by the mechanical engineer for the project. The units assumed for design are shown in Tables 4 and 5. Noise levels from the condenser units were calculated using ARI Standard 275 and noise levels from the kitchen exhaust and makeup air units were calculated using the same methodology as for the garage exhaust fan described above. Calculation worksheets are presented in the appendix to show the detail of the calculations

Table 4
Outdoor Condenser Unit Information

Drawing Symbol	Mfg	Model	Source Level
AC-103	Daikin	REYQ-240-PAYD (2)x120	63 dBA @ 3 feet
AC-201	Daikin	REYQ-72-PAYD	58 dBA @ 3 feet
AC-101	Daikin	RFYQ-96-PAYD	60 dBA @ 3 feet
AC-102	Daikin	RXYMQ-48-PVJU	58 dBA @ 3 feet
AC-104	Daikin	RXYMQ-36-PVJU	58 dBA @ 3 feet
AC-202	Daikin	RXYMQ-48-PVJU	58 dBA @ 3 feet
AC-203.1	Daikin	RXYQ-108-PATJ	60 dBA @ 3 feet
AC-203.2	Daikin	RXYQ-108-PATJ	60 dBA @ 3 feet
AC-CU-E2	Daikin	38 MVC-12	54 dBA @ 3 feet

Table 5
Kitchen Exhaust Fan (PCU) and Make Up Air Unit (MAU) Information

Unit	Mfg	Model	HP	Fan Size
PCU 103	CaptiveAire	KB25	15	25"
PCU 203.1	CaptiveAire	KB25	15	25"
PCU 203.2	CaptiveAire	KB20	10	20"
MAU-103	CaptiveAire	A4-D1000 920	7.5	20"
MAU-203	CaptiveAire	A5-D2000 925	20	25"

3.3 Noise Levels at Residences

3.3.1 Uncontrolled Noise Levels

Using the information presented in Section 3.2 noise levels at the residences to the north and south of the project site were calculated and the results are reported in Table 6. Worksheets in the appendix show the details of the calculations. The projected Leq(15) and Lmax noise levels for each noise source discussed above are presented. Note that the mechanical equipment generates essentially a consistent level of noise and the Lmax level is equal to the Leq(15) noise level.

Table 6
Uncontrolled Noise Levels

Noise Source	Residences to North Leq(15)	Residences to North Lmax	Residences to South Leq(15)	Residences to South Lmax
Dining Patios				
1st Floor East Side	38.0	40.2	41.4	43.6
2nd Floor East Side	36.2	40.2	39.6	43.6
2nd Floor South Side	29.5	37.7	44.9	53.2
Parking Garage	39.2	59.8	29.7	52.0
PCU Units	63.9	63.9	57.4	57.4
MAU Units	72.8	72.8	61.1	61.1
Condenser Units	45.4	45.4	33.7	33.7
Garage Exhaust Fan	46.7	46.7	32.9	32.9
Total Project Noise Level	***73.3***	***72.8***	***62.7***	***61.1***
Noise Ordinance Limit	50	70	50	70

Table 6 shows that without noise control measures the projected noise levels are greater than the most stringent nighttime noise ordinance limit except for the Lmax level at the residences to the south. Measures to reduce noise levels to comply with the City's Noise Ordinance are presented below along with the resulting noise levels.

3.3.2 Noise Control Measures

Table 6 shows that without noise control measures the noise levels generated by the project will exceed the nighttime noise limits. The mechanical equipment generates the highest noise levels. There is no practical way to reduce the condenser unit noise levels when considering the operational requirements of the units as well as project design limitations. The most effective method to reduce noise levels is to insert a silencer duct between the fan units and the outlets of the garage exhaust fan and PCU units and between the fan units and the inlets to the MAU Units.

The mechanical engineer for the project recommended considering silencers manufactured by VibroAcoustics. Noise levels were recalculated with various models of silencers and the silencers listed in Table 7 were determined to reduce noise levels to less than the applicable noise limits. Note that the silencers used for the project are not required to be the specific make and model shown in Table 7. Any silencers that provide the same amount of insertion loss will perform equivalently. Table 8 shows the minimum required insertion loss required to adequately reduce the noise levels of the units requiring silencers.

Table 7
Duct Silencers Assumed for Noise Control

Unit(s)	Manufacturer	Model	Length
Garage Exhaust (EF-2)	VibroAcoustics	RD-HV-F7	60"
PCU103, PCU 203.1, PCU 203.2	VibroAcoustics	RD-MV-F1	84"
MAU-103, MAU-203	VibroAcoustics	RD-HV-F1	84"

Table 8
Minimum Required Duct Silencer Insertion Loss

	Octave Band Insertion Loss							
Unit(s)	63	125	250	500	1000	2000	4000	8000
Garage Exhaust (EF-2)	3	5	13	26	29	23	16	11
PCU103, PCU 203.1, PCU 203.2	8	14	26	30	36	25	19	15
MAU-103, MAU-203	5	11	20	23	25	18	16	13

3.3.3 Controlled Noise Levels

The noise levels at the nearby residences were recalculated with the noise control measures described above. The results of these calculations are presented in Table 9. Worksheets showing the details of the calculations are presented in the appendix.

Table 9
Controlled Noise Levels

Noise Source	Residences to North Leq(15)	Lmax	Residences to South Leq(15)	Lmax
Dining Patios				
1st Floor East Side	38.0	40.2	41.4	43.6
2nd Floor East Side	36.2	40.2	39.6	43.6
2nd Floor South Side	29.5	37.7	44.9	53.2
Parking Garage	39.2	59.8	29.7	52.0
PCU Units	38.3	38.3	26.6	26.6
MAU Units	44.9	44.9	33.2	33.2
Condenser Units	45.4	45.4	33.7	33.7
Garage Exhaust Fan	35.2	35.2	21.4	21.4
Total Project Noise Level	***49.8***	***59.8***	***47.8***	***53.2***
Noise Ordinance Limit	50	70	50	70

Table 9 shows that noise levels generated by the project will be less than the most stringent nighttime limits of the City of Newport Beach Municipal Code. As discussed above, much of the mechanical equipment to be located on the roof of the retail building will be supplied and installed by the tenants of the project who are currently not known. If the equipment supplied by the tenants is substantially different from what was assumed for this analysis, a reassessment of the noise generated by the project will be warranted.

4.0 REFERENCES

ARI. *Standard 275 Application of Sound Rating Levels of Outdoor Unitary Equipment.* Arlington, VA: ARI, 2007.

ASHRAE. *ASHRAE Hanbook-HVAC Applications, Chapter 47 Sound and Vibration Control.* Atlanta, GA: ASHRAE, 2007.

The Planning Center|DC&E. *Inital Study for Mariner's Pointe Project.* Initial Study, Newport Beach: City of Newport Beach, 2011.

APPENDIX – CALCULATION WORKSHEETS

Mariner's Point

Garage Exhaust Fan and Noise Level Calculations Residences to North

	Octave Band Sound Power Level									A-Wght	
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**Rated**	**Calc**
Fan Sound Power Level											
445 CAF DW Inlet	96	97	94	89	83	77	70	63	101.0	91	90.6
Inlet to Outlet Correctioı	0	0	0	0	0	0	0	0			
445 CAF DW Outlet	96	97	94	89	83	77	70	63	101.0		90.6
Silencer Loss											
36" RD-HV-F7	-3	-4	-9	-16	-19	-15	-11	-7			
Duct Run Loss											
Loss/Foot 48x48 Unlined	0.15	0.1	0.7	0.02	0.02	0.02	0.02	0.02			
42" Run	-0.5	-0.4	-2.5	-0.1	-0.1	-0.1	-0.1	-0.1			
Turn Loss											
Vaned Turn 90˚										**fw**	**IL**
fw (76" w)	4.8	9.5	19.0	38.0	76.0	152.0	304.0	608.0		0	0
Loss	-4	-6	-4	-4	-4	-4	-4	-4		1.9	1
										3.8	4
										7.5	6
										15	4
End Reflection Loss											
72" Duct Terminated to I	-3	-1	0	0	0	0	0	0			
Lw at Outlet											
w/ Silencer	85.5	85.7	78.6	68.9	59.9	57.9	54.9	51.9	89.0	74.1	
w/o Silencer	88.5	89.7	87.6	84.9	78.9	72.9	65.9	58.9	94.2	85.6	
-20*log(d)											
d=35'	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9			
+10*logQ											
Q=2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lp @ Receptor											
w/ Silencer	46.6	46.8	39.7	30.1	21.1	19.1	16.1	13.1	50.2	***35.2***	
w/o Silencer	49.6	50.8	48.7	46.1	40.1	34.1	27.1	20.1	55.3	***46.7***	
% of Total w/ Silencer	3%	35%	38%	14%	4%	3%	2%	0%			

Mariner's Point

Garage Exhaust Fan and Noise Level Calculations Residences to South

	Octave Band Sound Power Level									A-Wght	
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**Rated**	**Calc**
Fan Sound Power Level											
445 CAF DW Inlet	96	97	94	89	83	77	70	63	101.0	91	90.6
Inlet to Outlet Correctio	0	0	0	0	0	0	0	0			
445 CAF DW Outlet	96	97	94	89	83	77	70	63	101.0		90.6
Silencer Loss											
36" RD-HV-F7	-3	-4	-9	-16	-19	-15	-11	-7			
Duct Run Loss											
Loss/Foot 48x48 Unlined	0.15	0.1	0.7	0.02	0.02	0.02	0.02	0.02			
42" Run	-0.5	-0.4	-2.5	-0.1	-0.1	-0.1	-0.1	-0.1			
Turn Loss											
Vaned Turn 90˚										**fw**	**IL**
fw (76" w)	4.8	9.5	19.0	38.0	76.0	152.0	304.0	608.0		0	0
Loss	-4	-6	-4	-4	-4	-4	-4	-4		1.9	1
										3.8	4
										7.5	6
										15	4
End Reflection Loss											
72" Duct Terminated to I	-3	-1	0	0	0	0	0	0			
Lw at Outlet											
w/ Silencer	85.5	85.7	78.6	68.9	59.9	57.9	54.9	51.9	89.0	74.1	
w/o Silencer	88.5	89.7	87.6	84.9	78.9	72.9	65.9	58.9	94.2	85.6	
-20*log(d)											
d=173'	-44.7	-44.7	-44.7	-44.7	-44.7	-44.7	-44.7	-44.7			
+10*logQ											
Q=2	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			
Lp @ Receptor											
w/ Silencer	32.7	32.9	25.8	16.2	7.2	5.2	2.2	-0.8	36.3	***21.4***	
w/o Silencer	35.7	36.9	34.8	32.2	26.2	20.2	13.2	6.2	41.4	***32.9***	
% of Total w/ Silencer	3%	35%	38%	14%	4%	3%	2%	0%			

Mariner's Point

Kitchen Exhaust Fan and Make Up Air Unit Noise Level Calculations Residences to North

			Octave Band Sound Power Level									A-Wght	
MFG	**Model**	**Unit**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**Rated**	**Calc**
Captive Aire	KB20	PCU 203.2	81.2	81.9	89.3	89.5	81.5	77.5	73.3	69.1	93.5	89.2	89.0
Captive Aire	KB25	PCU 203.1	81.0	87.2	87.9	84.0	80.4	76.0	69.4	62.4	92.2	85.9	86.1
Captive Aire	KB25	PCU 103	85.9	89.0	91.9	89.9	85.4	81.7	75.6	68.6	96.3	91.3	91.1
Captive Aire	A4-D1000 920	MAU-103	99.0	94.2	85.5	85.6	80.2	77.1	72.3	69.6	100.6	87.3	87.1
Captive Aire	A5-D2000 925	MAU-203	96.1	94.2	86.5	84.0	82.5	80.2	76.0	71.4	98.9	88.2	88.0

Adjustment for distance and reflecting surfaces

-20*log(d)= -33.1 d= 45

+10*logQ= 3.0 Q= 2

Sound Pressure Level at Receptor w/o Silencer

	Octave Band Sound Pressure Level									
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**A-Wgtd**
PCU 203.2	51.1	51.8	59.2	59.4	51.4	47.4	43.2	39.0	63.5	59.0
PCU 203.1	50.9	57.1	57.8	53.9	50.3	45.9	39.3	32.3	62.2	55.9
PCU 103	55.8	58.9	61.8	59.8	55.3	51.6	45.5	38.5	66.2	61.1
								PCU Subtotal	***69.1***	***63.9***
MAU-103	68.9	64.1	55.4	55.5	50.1	47.0	42.2	39.5	70.5	57.0
MAU-203	66.0	64.1	56.4	53.9	52.4	50.1	45.9	41.3	68.8	58.0
								MAU Subtotal	***72.8***	***60.5***
								Total	**74.3**	**65.5**

Silencer Noise Reduciton

				Octave Band Insertion Loss								Pressure Drop	
Model	**Length (in)**	**Face Vel**	**Unit**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Face Vel**	**in w.g.**
RD-MV-F1	84.0	1,250	PCU 203.2	8.0	14.0	26.0	30.0	36.0	25.0	19.0	15.0	1,172	0.15
RD-MV-F1	84.0	1,250	PCU 203.1	8.0	14.0	26.0	30.0	36.0	25.0	19.0	15.0	991	0.12
RD-MV-F1	84.0	1,250	PCU 103	8.0	14.0	26.0	30.0	36.0	25.0	19.0	15.0	1,617	0.28
RD-HV-F1	84.0	2,000	MAU-103	5.0	11.0	20.0	23.0	25.0	18.0	16.0	13.0	-1,832	0.23
RD-HV-F1	84.0	2,000	MAU-203	5.0	11.0	20.0	23.0	25.0	18.0	16.0	13.0	-1,772	0.22

Mariner's Point

Kitchen Exhaust Fan and Make Up Air Unit Noise Level Calculations Residences to North

Sound Pressure Level at Receptor w/ Silencer

			Octave Band Sound Pressure Level								A-Wgtd
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**A-Wgtd**	**Ins. Loss**
PCU 203.2	43.2	37.9	33.3	29.5	18.1	23.5	24.4	24.1	44.9	32.6	26.3
PCU 203.1	43.1	43.2	32.0	24.4	18.6	22.9	20.9	17.4	46.4	31.6	24.3
PCU 103	47.9	45.0	35.9	30.0	21.2	27.3	26.7	23.6	50.0	35.5	25.6
								PCU Subtotal	***52.4***	***38.3***	***25.6***
MAU-103	63.9	53.2	35.7	33.1	27.5	30.7	26.8	26.6	64.3	41.9	15.1
MAU-203	61.0	53.2	36.8	32.0	29.6	33.4	30.3	28.4	61.7	41.8	16.1
								MAU Subtotal	***66.2***	***44.9***	***15.6***
								Total	**66.4**	**45.8**	**19.8**

PCU Silencer Self-Noise Consideration

			Sound Power Level - Silencer Insertion Loss						Face	Face
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Vel.**	**Correction**
PCU 203.2	73.2	67.9	63.3	59.5	45.5	52.5	54.3	54.1	1,172	-0.3
PCU 203.1	73.0	73.2	61.9	54.0	44.4	51.0	50.4	47.4	991	1.5
PCU 103	77.9	75.0	65.9	59.9	49.4	56.7	56.6	53.6	1,617	1.5

			RD-MV Self Noise (5 SF Face Area)						
Face Vel	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
-1250	53	50	49	50	52	50	40	28	
-750	50	43	42	41	41	34	22	26	
750	51	39	35	33	37	33	23	26	
1250	56	51	45	43	45	47	40	29	<---

			Unit Sound Power Level - Self Noise					
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
PCU 203.2	-17.5	-17.2	-18.6	-16.8	-0.8	-5.8	-14.6	-25.4
PCU 203.1	-15.5	-20.7	-15.4	-9.5	2.1	-2.5	-8.9	-16.9
PCU 103	-20.4	-22.5	-19.4	-15.4	-2.9	-8.2	-15.1	-23.1

			Self Noise Correction					
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
PCU 203.2	0.1	0.1	0.1	0.1	2.6	1.0	0.1	0.0
PCU 203.1	0.1	0.0	0.1	0.5	4.2	1.9	0.5	0.1
PCU 103	0.0	0.0	0.0	0.1	1.8	0.6	0.1	0.0

Mariner's Point

Kitchen Exhaust Fan and Make Up Air Unit Noise Level Calculations Residences to North

MAU Silencer Self-Noise Consideration

				Sound Power Level - Silencer Insertion Loss					Face	Face
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Vel.**	**Correction**
MAU-103	94.0	83.2	65.5	62.6	55.2	59.1	56.3	56.6	-1,832	-0.3
MAU-203	91.1	83.2	66.5	61.0	57.5	62.2	60.0	58.4	-1,772	1.5

				RD-HV Self Noise (5 SF Face Area)					
Face Vel	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
-2000	58	55	54	54	54	56	48	38	<----
-1250	54	49	47	46	46	43	32	27	
1250	57	47	40	39	41	39	28	26	
2000	60	55	50	48	49	52	45	33	

				Unit Sound Power Level - Self Noise				
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
MAU-103	-36.3	-28.5	-11.8	-8.9	-1.5	-3.4	-8.6	-18.9
MAU-203	-31.6	-26.7	-11.0	-5.5	-2.0	-4.7	-10.5	-18.9

				Self Noise Correction				
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
MAU-103	0.0	0.0	0.3	0.5	2.3	1.6	0.6	0.1
MAU-203	0.0	0.0	0.3	1.1	2.1	1.3	0.4	0.1

Mariner's Point

Kitchen Exhaust Fan and Make Up Air Unit Noise Level Calculations-Residences to South

			Octave Band Sound Power Level									A-Wght	
MFG	**Model**	**Unit**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**Rated**	**Calc**
Captive Aire	KB20	PCU 203.2	81.2	81.9	89.3	89.5	81.5	77.5	73.3	69.1	93.5	89.2	89.0
Captive Aire	KB25	PCU 203.1	81.0	87.2	87.9	84.0	80.4	76.0	69.4	62.4	92.2	85.9	86.1
Captive Aire	KB25	PCU 103	85.9	89.0	91.9	89.9	85.4	81.7	75.6	68.6	96.3	91.3	91.1
Captive Aire	A4-D1000 920	MAU-103	99.0	94.2	85.5	85.6	80.2	77.1	72.3	69.6	100.6	87.3	87.1
Captive Aire	A5-D2000 925	MAU-203	96.1	94.2	86.5	84.0	82.5	80.2	76.0	71.4	98.9	88.2	88.0

Adjustment for distance and reflecting surfaces

-20*log(d)= -44.7 d= 172.5

+10*logQ= 3.0 Q= 2

Sound Pressure Level at Receptor w/o Silencer

	Octave Band Sound Pressure Level									
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**A-Wgtd**
PCU 203.2	39.5	40.2	47.6	47.8	39.8	35.8	31.6	27.4	51.8	47.3
PCU 203.1	39.3	45.5	46.2	42.3	38.7	34.3	27.7	20.7	50.5	44.2
PCU 103	44.2	47.3	50.2	48.2	43.7	40.0	33.9	26.9	54.6	49.4
								PCU Subtotal	***57.4***	***52.2***
MAU-103	57.3	52.5	43.8	43.9	38.5	35.4	30.6	27.9	58.9	45.3
MAU-203	54.4	52.5	44.8	42.3	40.8	38.5	34.3	29.7	57.2	46.3
								MAU Subtotal	***61.1***	***48.8***
								Total	**62.7**	**53.9**

Silencer Noise Reduciton

				Octave Band Insertion Loss								Pressure Drop	
Model	**Length (in)**	**Face Vel**	**Unit**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Face Vel**	**in w.g.**
RD-MV-F1	84.0	1,250	PCU 203.2	8.0	14.0	26.0	30.0	36.0	25.0	19.0	15.0	1,172	0.15
RD-MV-F1	84.0	1,250	PCU 203.1	8.0	14.0	26.0	30.0	36.0	25.0	19.0	15.0	991	0.12
RD-MV-F1	84.0	1,250	PCU 103	8.0	14.0	26.0	30.0	36.0	25.0	19.0	15.0	1,617	0.28
RD-HV-F1	84.0	2,000	MAU-103	5.0	11.0	20.0	23.0	25.0	18.0	16.0	13.0	-1,832	0.23
RD-HV-F1	84.0	2,000	MAU-203	5.0	11.0	20.0	23.0	25.0	18.0	16.0	13.0	-1,772	0.22

Mariner's Point

Kitchen Exhaust Fan and Make Up Air Unit Noise Level Calculations-Residences to South

Sound Pressure Level at Receptor w/ Silencer

					Octave Band Sound Pressure Level						A-Wgtd
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Lin**	**A-Wgtd**	**Ins. Loss**
PCU 203.2	31.6	26.3	21.6	17.9	6.4	11.8	12.7	12.4	33.3	21.0	26.3
PCU 203.1	31.4	31.5	20.3	12.7	6.9	11.2	9.2	5.8	34.7	19.9	24.3
PCU 103	36.2	33.3	24.2	18.3	9.5	15.6	15.0	11.9	38.3	23.8	25.6
								PCU Subtotal	***40.7***	***26.6***	***25.6***
MAU-103	52.3	41.5	24.1	21.4	15.8	19.0	15.1	14.9	52.6	30.3	15.1
MAU-203	49.4	41.5	25.1	20.4	17.9	21.7	18.6	16.7	50.1	30.2	16.1
								MAU Subtotal	***54.5***	***33.2***	***15.6***
								Total	**54.7**	**34.1**	**19.8**

PCU Silencer Self-Noise Consideration

					Sound Power Level - Silencer Insertion Loss				Face	Face
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Vel.**	**Correction**
PCU 203.2	73.2	67.9	63.3	59.5	45.5	52.5	54.3	54.1	1,172	-0.3
PCU 203.1	73.0	73.2	61.9	54.0	44.4	51.0	50.4	47.4	991	1.5
PCU 103	77.9	75.0	65.9	59.9	49.4	56.7	56.6	53.6	1,617	1.5

					RD-MV Self Noise (5 SF Face Area)				
Face Vel	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
-1250	53	50	49	50	52	50	40	28	
-750	50	43	42	41	41	34	22	26	
750	51	39	35	33	37	33	23	26	
1250	56	51	45	43	45	47	40	29	<---

					Unit Sound Power Level - Self Noise			
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
PCU 203.2	-17.5	-17.2	-18.6	-16.8	-0.8	-5.8	-14.6	-25.4
PCU 203.1	-15.5	-20.7	-15.4	-9.5	2.1	-2.5	-8.9	-16.9
PCU 103	-20.4	-22.5	-19.4	-15.4	-2.9	-8.2	-15.1	-23.1

				Self Noise Correction				
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
PCU 203.2	0.1	0.1	0.1	0.1	2.6	1.0	0.1	0.0
PCU 203.1	0.1	0.0	0.1	0.5	4.2	1.9	0.5	0.1
PCU 103	0.0	0.0	0.0	0.1	1.8	0.6	0.1	0.0

Mariner's Point

Kitchen Exhaust Fan and Make Up Air Unit Noise Level Calculations-Residences to South

MAU Silencer Self-Noise Consideration

				Sound Power Level - Silencer Insertion Loss					Face	Face
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**Vel.**	**Correction**
MAU-103	94.0	83.2	65.5	62.6	55.2	59.1	56.3	56.6	-1,832	-0.3
MAU-203	91.1	83.2	66.5	61.0	57.5	62.2	60.0	58.4	-1,772	1.5

				RD-HV Self Noise (5 SF Face Area)					
Face Vel	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
-2000	58	55	54	54	54	56	48	38	<----
-1250	54	49	47	46	46	43	32	27	
1250	57	47	40	39	41	39	28	26	
2000	60	55	50	48	49	52	45	33	

				Unit Sound Power Level - Self Noise				
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
MAU-103	-36.3	-28.5	-11.8	-8.9	-1.5	-3.4	-8.6	-18.9
MAU-203	-31.6	-26.7	-11.0	-5.5	-2.0	-4.7	-10.5	-18.9

				Self Noise Correction				
Unit	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
MAU-103	0.0	0.0	0.3	0.5	2.3	1.6	0.6	0.1
MAU-203	0.0	0.0	0.3	1.1	2.1	1.3	0.4	0.1